

WE CLAIM:

1. A scroll housing for use in conjunction with a fluid compressor comprising:
 - an inlet adapted to receive a flow of fluid;
 - a scroll shaped outer wall;
 - 5 a forward flange and an aft flange formed on said scroll shaped outer wall; an outlet; and
 - a plurality of scroll vanes integrally formed with said scroll shaped outer wall and said aft flanges, and said plurality of scroll vanes connecting said forward and aft flanges, said plurality of scroll vanes adapted for guiding the
 - 10 flow of fluid from said inlet to said outlet while supporting said scroll housing.
2. The scroll housing of claim 1, wherein
 - each of said plurality of scroll vanes has a leading edge and a trailing edge,
 - said leading edge and said trailing edge are separated by a chord
 - 5 length, wherein said chord length enables at least one of said plurality of scroll vanes to carry a load upon said scroll housing adjacent each of said plurality of scroll vanes.
3. The scroll housing of claim 1, wherein at least one of said plurality of scroll vanes has a cross sectional area, wherein said cross sectional area carries a load upon said scroll housing adjacent each of said plurality of scroll vanes.
- 5 4. The scroll housing of claim 1, wherein said plurality of scroll vanes carry a portion of a load on said scroll housing, said portion in the range of 70-100 % of the load.

5. The scroll housing of claim 1, wherein said scroll housing is cast titanium.
6. The scroll housing of claim 1, wherein said fluid is air.
7. A compressor including a scroll housing, said compressor comprising:
 - an impeller;
 - said scroll housing having a scroll shaped outer wall; an inlet
 - 5 adapted for receiving a fluid from said impeller; and a plurality of scroll vanes integrally formed with said scroll shaped outer wall,
 - wherein said plurality of scroll vanes are adapted for guiding the flow of fluid from said inlet to an outlet, and
 - wherein said plurality of scroll vanes are further adapted for
 - 10 supporting said scroll housing.
8. The compressor of claim 7, wherein said scroll shaped outer wall includes a forward flange and an aft flange, said forward flange and said aft flange are circular and formed on said scroll shaped outer wall.
9. The compressor of claim 8, wherein said forward flange and said aft flange each include a flat machined surface.
10. The compressor of claim 9, further including a diffuser disposed between said impeller and said scroll housing.
11. The compressor of claim 9, wherein said plurality of scroll vanes carry a portion of a load on said scroll housing, said portion in the range of 70-100% of the load.

12. The compressor of claim 7, wherein said plurality of scroll vanes carry a portion of a load on said scroll housing, said portion in the range of 98-100 % of the load.

13. The compressor of claim 12, wherein said fluid is air and wherein said scroll housing is cast titanium.

14. A turbo-machine, comprising;
a compressor having a scroll housing; a forward engine housing and an aft engine housing, said compressor connected to said engine between said forward engine housing and said aft engine housing and an impeller;
5 wherein, said compressor having a scroll shaped outer wall and said compressor including a plurality of scroll vanes for receiving fluid from said impeller, said plurality of scroll vanes integrally formed with said scroll shaped outer wall, and said plurality of scroll vanes adapted for guiding the flow of fluid from an inlet to an outlet while said plurality of scroll vanes support said scroll
10 housing against loads from said forward engine housing and said aft engine housing.

15. The turbo-machine of claim 14, wherein each of said plurality of scroll vanes has a cross sectional area, said cross sectional area designed to carry said loads, said loads including at least a carcass load between said forward engine housing and said aft engine housing, and a pressure load generated by fluid pressure from said impeller.

16. The turbo-machine of claim 15, wherein said integrally formed scroll shaped housing and said plurality of scroll vanes are formed by investment casting titanium.

17. The turbo-machine of claim 14, wherein a forward flange and an aft flange are formed on said scroll shaped outer wall, said forward flange connecting said scroll shaped housing to said forward engine housing, and said aft flange connecting said scroll shaped outer wall to said aft engine housing.

18. The turbo-machine of claim 14, wherein each of said plurality of scroll vanes has a cross sectional area determined by a portion of said loads acting on said scroll shaped housing adjacent to each of said plurality of scroll vanes.

19. The turbo-machine of claim 17, wherein said forward flange includes a machined surface adapted to fit to said forward engine housing, and wherein said aft flange includes a machined surface adapted to fit to said aft engine housing.

20. The turbo-machine of claim 14, wherein each of said plurality of scroll vanes gets progressively larger as an air flow path in said scroll shaped housing increases in cross sectional area.

21. A scroll housing for use in combination with an air compressor, comprising:
- 5 a scroll shaped outer wall;
 a forward flange and an aft flange formed on said scroll shaped
outer wall,
 a plurality of scroll vanes integrally formed with said scroll shaped
outer wall and with said forward and aft flanges,
 each of said plurality of scroll vanes including a leading edge and
a trailing edge, each of said plurality of scroll vanes guiding a flow of air through
10 said scroll housing while supporting said scroll housing.
22. The scroll housing of claim 21, wherein said each of said plurality
of scroll vanes gets progressively larger in a radial direction around said scroll
shaped outer wall.
23. The scroll housing of claim 21, wherein each of said plurality of
scroll vanes is sized according to a local load distribution in said scroll housing.
24. The scroll housing of claim 22, wherein said plurality of scroll
vanes carry 70-100% of a load transmitted between said forward flange and
said aft flange.

25. A method of making a scroll housing for use with an impeller connected to an engine, including the steps of:
- determining the optimum size and shape characteristics for the scroll housing;
 - 5 calculating loads on a scroll shaped outer wall of said scroll housing;
 - based on said calculating loads step, designing a plurality of scroll vanes internal to said scroll shaped outer wall ; and
 - based on said designing step, casting said scroll housing and
 - 10 said plurality of scroll vanes as one piece.
26. The method of claim 25, wherein said casting is investment casting.
27. The method of claim 25, wherein said step of calculating loads includes the step of calculating local loads on the scroll shaped outer wall, and said step of designing a plurality of scroll vanes includes the step of determining the cross-sectional area of each of said plurality of scroll vanes to support said
- 5 local loads.
28. The method of claim 26, wherein, based on said designing step, an equal stress occurs in each of said plurality of scroll vanes.

29. A method of operating turbo-machinery, including the steps of;
providing an airflow with an impeller;
guiding said airflow through a scroll housing using a plurality of
scroll vanes integrally cast with said scroll housing; and
5 supporting a load on said scroll housing with said plurality of
scroll vanes.

30. The method of claim 29, wherein said scroll housing is cast in
one piece.

31. The method of claim 29, wherein the step of supporting a load on
said scroll housing includes the step of maintaining an equal stress in each of
said plurality of scroll vanes.

32. The method of claim 31, wherein the step of maintaining an equal
stress includes determining a chord length, cross sectional area and distance
from a scroll housing wall for each of said plurality of scroll vanes.